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SOME ASPECTS OF ETIOLOGICAL DIAGNOSIS OF OCCUPATIONAL ILLNESS RELATED TO THE EFFECT OF MICROWAVE RADIATION

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[Text] One of the production factors which, according to several investigations in recent years, is reflected in the frequency of cardiovascular illness is microwave radiation (B. V. Il'inskiy and co-authors; V. P. Medvedev). Because work with sources of UHF radiation, whether it is tuning radio equipment or the work of radar station operators, requires substantial nervous-emotional stress and involves other unfavorable aspects, the etiological diagnosis of illness of the blood circulatory apparatus in such groups presents great difficulties.

According to the findings of various authors, changes in the activity of the cardiovascular system which occur in persons working with sources of microwave radiation make up the syndrome of neurocirculatory dystonia of the hypo- or hypertonic types (Ye. V. Gembitskiy; N. V. Tyagin; K. V. Glotova and M. N. Sadchikova) and may lead to the development of hypertension and ischemia of the heart (B. V. Il'inskiy and co-authors; V. P. Medvedev).

When comparing data for a number of years on the frequency of arterial hypertension and hypotonia in persons working in contact with UHF radiation it may be noted that the frequency of arterial hypotonia has dropped markedly in recent years, from 38 percent in data for 1948 (A. A. Kevorkyan) to seven percent for 1971 (M. N. Sadchikova and K. V. Nikonova). The greater frequency of arterial hypotonia found in surveys of persons working under most unfavorable conditions in 1948-1964 (22 percent according to Yu. A. Osipov, 26 percent in N. M. Konchalovskaya and co-authors) when protective devices were not yet in use points to a significant likelihood that there is a relation between neurocirculatory hypotonia and the effect of microwave radiation. As for arterial

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hypertonia, its spread among persons subject to UHF radiation has risen noticeably in recent years: from 5.8-7.6 percent in publications for 1963-1964 to 28 percent for 1971-1972. Although many investigators do not indicate the criteria which they adopted for evaluating increased arterial pressure, overall the frequency of hypertonia with chronic effect of UHF fields coincides, according to research findings for 1970-1972, with the frequency found in surveys of the unorganized population of Moscow and using WHO criteria (V. I. Metelitsa): 28 percent for the male population in the 35-64 age bracket.

The broad distribution of functional cardiopathies points to the need for a careful analysis of each concrete case in identifying the occupational etiology of cardiovascular illness.

The so-called risk factors for the development of hypertonia and ischemia of the heart have been studied in detail.

The distribution of the five main risk factors and their significance in the development of cardiac ischemia are presented in Table 1 below. The table is taken from the work of V. I. Metelitsa.

Table 1. Distribution of the Five Main Risk Factors and Their Influence on the Frequency of Cardiac Ischemia

Risk Factor	Frequency of Distribution			Increase in Risk of Cardiac Ischemia
	%	Ave. Age	Criterion	
Hypercholesterolemia	23+	35-64	Above 259 mg%	2.2-5.5 times, well established
Arterial Hypertonia	28	35-64	Systolic art. pres. 140 mm merc. col. and more, diastolic 90 mm and more	1.5-6 times, well established
Smoking	50	30-64	Regular Smoking	1.5-6.5 times, well established
Sedentary Way of Life	-	-	-	1.4-4.4 times, inadequately studied
Excess Weight	22	35-64	9 kg and more over average weight	1.3-3.4 times, poorly documented

Other proven risk factors for the development of cardiac ischemia beyond those shown in Table 1 are: genetic factors, emotional stress, and individual psychological factors which condition a person's response to the environment, and so on.

The objective of the present work was to make a detailed analysis of possible risk factors for the development of cardiovascular pathology in 21 patients diagnosed as having radio wave sickness.

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The patients were returned to the hospital in 1973-1974. All the subjects had formerly worked under unfavorable conditions of excessive radiation. At the times they returned to the hospital, all the subjects had been away from work in contact with radiation for 2-3 years. All subjects were men between the ages of 35 and 54; most of them (19) were between 40 and 54 and had had contact with radiation for more than 10 years.

On the basis of general clinical diagnostic criteria the following cardiovascular illnesses were identified: neurocirculatory dystonia of the hypertonic type — seven cases, hypertonia — 10, cardiac ischemia — two, and hypothalamic deficiency — two. According to our observations, the 40-49 age bracket was most subject to these diseases.

The 2-3 year period after contact with radiation ceased did not cause a noticeable change in the course of cardiovascular illness in the subjects. For the hypertonic patients high arterial pressure (more than 160/100 mm mercury column) could be normalized in the clinic only by comprehensive hypotensive therapy. In three patients hypertonic crises with temporary manifestations of impairment of cerebral circulation developed at the clinic despite the therapy.

In the two ischemia patients pains were noted during examination in the area of the heart and behind the sternum with irradiation below the left scapula and into the left arm; these were arrested with Validol and nitroglycerine. Electrocardiogram examination of these patients showed changes of types 4-1, 4-2, 5-1, and 5-2 of the Minnesota code, which are typical for cardiac ischemia.

Table 2 shows that nervous-emotional stress and dangerous habits were the main external risk factors in the 21 victims of diagnosed radiowave sickness. The most common endogenic factors were hypercholesterolemia, arterial hypertonia, excess weight, and aggravated heritability.

Table 2. Quantitative Distribution of Certain Factors Unfavorable for the Development of Cardiovascular Illnesses in 21 Patients with a Diagnosis of Radio Wave Sickness

Factor	Number of Cases with Factor
Nervous-Emotional Overload	14
Combining Work and Study	4
Night Shifts	17
Regular Smoking	7
Moderate Consumption of Alcohol	7
Aggravated Heritability	5
Cranial Trauma in History	3
Excess Weight	5
Hypercholesterolemia	12
Arterial Hypertonia	10

Table 3 (next page) shows the combination of the different risk factors in the 10 victims of arterial hypertonia with the diagnosis of radio wave

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sickness. In five of the 10 at least three unfavorable factors were combined, while in the others there were 4-6 factors in combination. Thus, all the conventional risk factors maintain their importance for the occurrence of cardiovascular pathology in these 10 observations.

Table 3. Distribution of Unfavorable Factors in 10 Victims of Arterial Hypertonia with a Diagnosis of Radio Wave Sickness

Key: (a) Patient [under this heading are abbreviated names of 10 patients];
 (b) Age Group [the Russian words under this heading mean "years"];
 (c) Nervous-Emotional Overload;
 (d) Combining Work and Study;
 (e) Night Shifts;
 (f) Aggravated Heritability;
 (g) Cranial Trauma;
 (h) Excess Weight;
 (i) Hypercholesterolemia.

Therefore, in diagnosing cardiovascular illnesses in persons subject to UHF radiation, in addition to evaluation of working conditions there must be analysis of the etiological and pathogenetic factors, according to general rules. In each case it is also necessary to take account of such frequently encountered signs of cardiopathy as changes in the neck-chest segment of the spinal column, intercostal neuralgia, cardiac spasm, and spastic or atonic colopathy. In examination of working conditions one must not restrict study to establishing the high level of UHF fields, but also pay attention to the degree of nervous-emotional stress, combining work and study, and work during nighttime hours.

As for the effect of microwave radiation on the occurrence of cardiovascular illness, in our view it can probably occupy a certain place among the other unfavorable factors. But there is as yet no basis for linking the development of the illness with it alone. The question can be finally resolved only on the basis of results from a well-organized epidemiological examination of appropriate groups combined with a study of the proven risk factors found among them.

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The results of this investigation, compared with data on the distribution of these illnesses among the unorganized population, will help isolate the role of microwave radiation as a more or less significant etiological factor in the development of cardiovascular pathology.

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